

**ABSTRACTS of the 1st Annual Meeting of the
Midwest Bioarcheology & Forensic Anthropology Association
State Historical Society, Madison, Wisconsin
October 1, 1994**

Abstracts are given in alphabetical order by senior author; all papers are podium presentations unless noted otherwise.

(1) ANAPOL, Fred. "Demonstration of Polhemus 3-Draw, 3-Dimensional Digitizing Tablet."
(abstract not available)

(2) BURTON, James. "The Use of Bone Levels of Strontium as a Paleodietary Indicator."

It has long been recognized that strontium and barium enter bone in proportion to their dietary abundances. Because plants are generally higher in these elements than is meat, these elements have been used by archaeologists to try to determine the plant/meat ratio of prehistoric diets. Archaeologists have recognized a number of other factors affecting the abundances of these elements in bone and, with variable success, have compensated for them. One significant factor, not previously explored, is how the composition of the diet itself changes with varying plant/meat ratios. Calculation of model dietary compositions reveal that the composition of diet does not vary in a simple, proportional manner with varying plant/meat ratios. Instead, various foods are reflected in the composition of the diet, and hence in the composition of the bone, in proportion to their total contribution of bone-forming mineral, principally calcium, to the diet. High calcium foods contribute substantially to the mineral composition of the diet and bone, while low mineral foods, such as maize, may have virtually no direct effect on diet composition. While this precludes using bone levels of these elements for determination of trophic position, their abundances can nonetheless place strong constraints upon the possible mineral sources in the diet. For example, low strontium values in bone can only be achieved if most of the bone-forming mineral is derived from meat. Meat, even in large amounts, will have little effect on the composition of diet if consumed with any significant proportion (>20%) of typically high-mineral plants. On the other hand, even modest amounts of meat can affect the composition of diet, and bone, if low-mineral maize is the major plant component. While low strontium levels in bone can not be used as a direct index of the percentage of meat consumption, they imply both the consumption of meat and an insignificant level of high-mineral plant foods in the diet. Similarly, low barium can be diagnostic of seafood. This deficit of barium will not appear if low-mineral seafood is a component of an otherwise mineral-rich (e.g., non-starchy plants), high-barium diet. If the seafood is high in bone-forming mineral, e.g. if anchovies or fishmeal are consumed, or if seafood is consumed along with mostly low-mineral cultigens, then the diagnostic barium deficit will appear in the bones. Thus both elements have utility for constraining possible prehistoric diets, but not as a simplistic index of dietary plant/meat or marine/terrestrial ratios. They are a reflection of those foods that are contributing most of the bone-forming minerals, i.e. those foods that are highest in calcium. (NOTE: see Burton JH, Wright LE. 1995. Nonlinearity in the relationship between bone Sr/Ca and diet: Paleodietary implications. *American Journal of Physical Anthropology* 96:235-282).

(3) CAHUE, Laura. "The Urichu Skeletal Remains: An Assessment of Elites in the Emergence of the Tarascan State." (abstract not available)

(4) COOK, Della Collins. "The Interface Between Forensic Anthropology and Bioarchaeology: A Case Report." (abstract not available)

(5) FAIRGRIEVE, Scott. "Problems with the Analysis of Cremated Dental Remains and Determining Positive Identification."

The intentional cremation of a 48-year-old male in Northern Ontario in the late summer of 1992 presented some challenges to the identification of the remains. Utilizing forensic archaeological techniques of documentation and collection of the cremated, purposefully scattered and crushed remains, the author was able to recover several dental remains that eventually proved to be key to the identification of the remains. As all the dental work, including fillings made of amalgam and porcelain, had been eliminated during the cremation process, the author utilized an SEM (scanning electron microscope) in order to check for evidence of dental drill striations on the recovered enamel fragments. A tooth with a dislodged filling was used as a control for the drill striation characteristics. The type and position of the filling was found to be consistent with the dental records of the suspected decedent. Other dental characteristics including tooth shape/form, an artificial crown, and occlusal projections of dentine on a lower canine, all contributed to the positive identification of the individual. Thus, SEM analysis of cremated, and fragmentary dental tissue (specifically, enamel in this case) should not be overlooked as a potential source of information regarding the identity of cremated remains. (NOTE: see Fairgrieve S 1994. SEM analysis of incinerated teeth as an aid to positive identification. *Journal of Forensic Sciences* 39:557-565).

(6) HOUDEK, Diane. "Who Were the People of Dunning Poorhouse?" (abstract not available)

(7) LAROCQUE, Penelope, Ellen FITZSIMMONS STEINBERG, Karen WEINSTEIN, & Bruce MONSANO. "Assessing the Health of Fort Ancient's Upper and Lower Villages' Populations."

The Moorehead collection of skeletal remains from Ft. Ancient's Upper and Lower Villages is housed at the Field Museum in Chicago. The collection, excavated in 1891, contains the remains of 80 individuals: 24 infants, 2 juveniles, 16 adult females, 19 adult males, and 19 adults of undetermined gender. The most prevalent pathologies are periosteal changes, osteoarthritis, porotic lesions and enamel hypoplasia. Healed fractures and dental caries occur infrequently. Analysis of the hypoplastic lines, present only on the incisors and canines, reveal, from their distance from the cemento-enamel junction, that they are most likely related to weaning stress. Arthritic changes appear primarily in the lumbo-sacral and cervical areas. Arthritis affects most adults regardless of gender, although males are more profoundly affected, implying different behavioral habits. Adult long bones are elliptical in shape, suggesting that these were not strict agriculturalists. The suite of bony traits present among the adults, and the lack of characteristic pathologies for agriculturalists, suggests that these people practiced a mixed subsistence strategy, living prior to the transition to agriculture in the region.

(8) MATHER SAUL, Julie. "'You Done Good': Cervical Nicks and an Unusual Confirmation of Probable Cause of Death."

(This abstract is purposely vague in regard to location, etc., in order to protect the identity of the alleged perpetrator). A body found out of doors in another jurisdiction was identified as a woman who had been missing for 2 weeks. The body was intact and in good condition except for heavy insect activity and decomposition of the left side of the neck, suggesting perimortem damage in that region. The only soft tissue damage found was possible perimortem fractures of the thyroid and cricoid cartilages. Coincidentally, an earlier skeletal case involving neck trauma had led me to begin collecting bone information in "fresh" cases where the weapon and cause of death were known. I had recently had the opportunity to study a woman who had been stabbed in the throat, noting very small perimortem defects on the first and seventh cervical vertebrae. These were injuries that would ordinarily not be noted by forensic pathologists, whose goal is to track damage to soft tissue, nor would they have been evident in radiographs. These small bone nicks were so innocuous that they might otherwise have been overlooked by forensic anthropologists who had not followed the wound track in soft tissue. Fortuitously, the neck vertebrae of the recently discovered woman revealed similar bone nicks in similar locations deep to the breach in the soft tissue of the neck (decomposition prevented any tracking of the wound in soft tissue). A fairly strong circumstantial case, together with the trauma analysis, caused the prosecuting attorney to charge the former husband with murder. Inasmuch as I was scheduled to be in the jungles of Belize during the trial, I was required to provide a video deposition, taped in the courtroom, with the defendant present and in my line of sight, as he was directly behind the camera that I was speaking to (as if it were the jury). He was a pleasant looking person (resembling a mature graduate student) who seemed to display real interest during my 1 hour and 45 minute testimony. Using his former wife's cervical vertebrae, photographic enlargements, and diagrams, I explained that these small bone "nicks" were consistent with what I had seen in known sharp force neck injury. Following my testimony, as he was leaving the courtroom, and from a distance of no more than 20 feet, he paused, looked me in the eye, and with a nod, a blush and a shy, small smile, he said to me... "You done good." I then left for Belize, assuming that he would plead. He did not, and a "sleepy, unattentive" jury (description by a colleague) found him not guilty. The next day, the jury foreperson indicated her discomfort with the verdict and asked the prosecutor if they could "try him again, because I don't think we did the right thing."

(9) MCNAMARA, Elizabeth, & Anne GRAUER. "A Piece of Chicago's Past: Exploring Childhood Mortality in the Dunning Poorhouse Cemetery."

Skeletons from the Dunning Cemetery population (n= 120), a skeletal collection associated with the 19th-century Chicago and Cook County Insane Asylum and Poorhouse, were analyzed to explore patterns of subadult mortality patterns and to gain insight into the demographic origin of this skeletal population. The analysis revealed that a high proportion (36%), of the Dunning skeletal population were below the age of 15. In order to determine if this proportion of subadults was representative of the living population of Chicago and Cook County, the paleodemographic information was compared with the 1860 US Federal Census, the 1870 US Federal Census, and a local enumeration -- the 1870 Chicago, IL Census Index. The demographic profile of Dunning was also compared to that from the Monroe County Poorhouse, due to the similar nature of the facilities. K-S Two Sample tests were applied to examine the cumulative differences between the census reports, the Dunning population, and the Monroe County Poorhouse. Statistically significant results were noted in all comparisons except those made between the two archaeological populations. This analysis suggests that the subadult sample from the Dunning skeletal population were not necessarily representative of the living

population of Chicago and Cook County. Detected biases in the Federal and local Census suggests that subadults were repeatedly underenumerated. The high proportion of subadults in the Dunning cemetery population was concluded to be an archaeological artifact. That is, children entering the poorhouse facility were likely to die, and would subsequently begin to contribute to a greater proportion of the skeletal material in the cemetery.

(10) MELBYE, Jerry, & Susan JIMENEZ. "The Butcher of Gloucester Street."

On or about October 3rd and 4th, 1992, human skeletal remains were discovered in the backyard of a residence on Gloucester Street in Toronto, Ontario. Laborers were excavating to lay the foundation for a parking area. The home is over 100 years old, and there was considerable debris in the fill including bones. No one considered the possibility that the bones were human until a skull was discovered. The police immediately investigated, recovered as many bones as they could from the loose fill, and submitted them to a forensic pathologist. Subsequently, we were called upon to provide a forensic anthropology investigation. The backyard was excavated by standard archaeological methods. Bones were common throughout the fill. For the most part, these were butchered bones of common domestic food animals. However, among these bones were 46 human bones and bone fragments. Several of these bones had saw marks not unlike those on the domestic fauna. The subsequent image of "The Butcher of Gloucester Street" emerged. The final outcome of the analysis was considerably less spectacular. Though several of the saw cuts remain in the "unusual" category, most of the cuts are consistent with early autopsy procedures. Other cuts would appear to be human anatomy demonstration specimens. The cuts are by a hand saw, and appear to be very old. A historical investigation of the area and the home reveals no clues to who discarded the specimens. The case remains open, but the police have suspended further investigation.

(11) MOORE-JANSEN, Peer. "Infant Cranial Trauma: A Case of Child Abuse or An Unfortunate Accident?" (abstract not available)

(12) NAWROCKI, Stephen. "Bioarcheology and Forensics in Indiana, 1991 - 1995."

The University of Indianapolis has recently established an Archeology and Forensics Laboratory to support student training and faculty research as well as to serve the community of Central Indiana in the analysis of human remains. Temporary facilities were used until permanent space became available during the summer of 1994, a result of a wave of building projects on the campus. Inhabiting a former ceramics laboratory in the basement of the oldest building on campus, the new lab covers more than 2600 square feet of floor space and includes separate rooms for photography, drafting, computer equipment, artifact curation, artifact processing, skeletal curation, skeletal preparation, excavation equipment storage, and cold storage. A large central teaching and analysis area can comfortably accommodate class sizes of 15 students. The lab currently supports archeological field schools in Alaska and Cyprus as well as the author's work in bioarcheology and forensics. Active skeletal cases can be secured in a limited-access chain of custody room that can accept a full-length wheeled cadaver tray, and an alarm system guards the perimeter of the entire lab. Bone processing, including boiling and PVA preservation, can be conducted in a fume hood in a room located well away from the central teaching and analysis areas. Between October 1991 and April 1995, a total of 60 cases had been received and processed, representing most of the skeletal recoveries made in Indiana in that time period. Eight of these turned out to be non-human and 7 were simple donations of human skeletal materials, leaving 45 human remains cases requiring analysis. Of these 45, 24 were accidental archeological discoveries from prehistoric (16 sites with 75+ individuals) or historic (8 sites with 35+

individuals) contexts, falling under the purview of the State Archeologist and the Indiana Department of Natural Resources. Examples include an Archaic period rockshelter burial, modified human trophy mandibles from the Mount Vernon ("General Electric") Hopewell mound, a number of isolated Woodland burials (one of which was eaten by the finder's year-old Dalmatian, complicating the analysis somewhat), a number of isolated historic coffin burials, and a heavily disturbed collection of "repatriated" historic cemetery remains. At least a few of these cases were discovered after illegal looting activities. The remaining 21 represent forensic cases, 13 of which were analyzed for forensic pathologists (primarily from the Indiana University School of Medicine in Indianapolis) and the others originating from county coroners, police, or attorneys. Examples include 5 isolated skulls recovered from fluvial contexts, 4 cremains, 4 infants or juveniles, 2 cases of mummification, 1 case of commingling, 2 unsuccessful searches for clandestine graves, and a CILHI review. One case involved less than 0.3 grams of cranial bone. (NOTE: this abstract was updated after the meetings to add casework handled through April 1995).

(13) O'BRIEN, Christopher. "Mortality in Non-Human Archaeological Faunas."

The patterns of mortality seen in the archaeological remains of larger game animals are frequently used to indicate the type of method practiced by hunters to acquire prey as well as human "choice" in selecting animals of a particular age class. Three types of mortality "profiles," defined as the frequency of individuals in a given age class, are recognized: catastrophic, attritional, and prime-dominated. Of the three, it is argued that prime-dominated profiles represent conscious choice on the part of hunters to target prime aged adult individuals while avoiding those in the juvenile and old adult age classes. Observations of zebra hunting by Hadza foragers in East Africa demonstrate that they also produce a prime-dominated profile. However, contrary to conventional interpretation, this is best explained by the limited availability of juveniles on the landscape and not by Hadza selection for prime adult animals. Similarly, as a consequence of zebra herding behavior and the manner in which Hadza hunters encounter zebra populations on the landscape, the mean age of zebra killed during the dry season is significantly higher than zebra killed in the wet season. These results suggest that seasonal changes in prey behavior may be a more significant influence on mortality profiles than human choice.

(14) PROST, Jack. "Comparative Skeletal Morphology: Which Traits are Genetic?"

Slides comparing three dimensional measurements of crania from the Field Museum are used to demonstrate that: (1) bone growth is everywhere local, in packets less than one millimeter in diameter; (2) the three dimensional forms of crania are the consequences of local growth imposed on younger forms. Genetic, cladistic, or biomechanical explanations that presume forms are produced as global structures are not supported by this data; (3) when growth appears to be organized into global units, that is, into structures larger than local packets, an "organizer" has coordinated growth between and among clusters of local packets. Global structures ("organettes") are bony areas analogous to Enlow's growth fields. Organizers are homologous to Moss's functional matrices; (4) functional brain areas affect neurocranial shape by acting as organizers. In an earlier study, I proposed that, during hominid evolution, differential growth in functional brain areas was responsible for shape changes in the fossil crania. That conclusion is reinforced by this work and I will reaffirm that cranial capacity is not a meaningful measure of evolutionary brain advancement.

(15) SAUL, Frank, & Julie MATHER SAUL. "Forensic Anthropology: A 'Reality Check' for Physical Anthropology."

Physical anthropologists who work only with ancient remains may be lulled into a sense of false security regarding their ability to designate individual skeletal remains as being of a certain sex and a specific age and perhaps to diagnose a lesion and associate it with degrees of disability. Such pronouncements are unlikely to be questioned, except rarely by rising graduate students or rival professors in need of a controversy. Unfortunately, the pronouncer cannot be proven right or wrong as the next of kin are long dead. Forensic anthropologists quickly learn that an error in assigning sex or a too narrow or inaccurate assessment of age will be discovered when the unknown remains are identified (unless, of course, the errors result in non-identification). Access to identified cases as well as known individuals on our autopsy tables provide us with continuing education and testing in regard to sex determination, age assessment, functional health status evaluation, etc. They also provide us with an opportunity to check the standards themselves. Metric sex and ancestry formulae based on ancient populations (therefore "unidentified" individuals) are accepted as being potentially inaccurate, and formulae based on dissecting room populations are assumed to be out of date, but it should be noted that even modern forensic case based formulae can result in misclassifications. In essence, forensic anthropology provides a "reality check" for our academic assumptions and all physical anthropologists need to proceed with caution. The interaction between studies of ancient and modern skeletal remains should be a two way street. Working with the poorly preserved remains of the ancient Maya has enhanced our ability to recognize, interpret and reconstruct very fragmentary forensic remains. This has been helpful in both identification analyses and interpretation of trauma and "weapon signatures" in support of determining cause of death -- the latter activity then provides perspective for the interpretation of trauma in ancient remains. We also have the opportunity to see what happens in ancient cases of injury or disease in the absence of modern medical intervention - our knowledge of modern clinical cases then cautions us not to overinterpret or overemphasize the physical disability that might be involved. We strongly encourage all physical anthropologists to work in both areas, or to at least learn from each other's findings. (NOTE: the oral presentation included specific examples and was followed by the opportunity for a self administered test using forensic case specimens of known sex, age, ancestry, parity).

(16) SCHMIDT, Christopher, Matthew WILLIAMSON, Mary TRUDEAU, & Criss HELMKAMP. "Current Bioarchaeology at Purdue University: The Young Cemetery Relocation Project."

In early September of 1994, Purdue Cultural Resource Management director Criss Helmkamp was approached by the Cass County, Indiana coroner about the excavation of a historic cemetery located on property owned by a State Hospital. The cemetery dates from 1837 - 1879. Four headstones representing five people marked the cemetery. Five individuals were recovered, including three brothers, one brother's wife, and their three year old daughter. Ages at death range from three years old to seventy-six years old for the adult female. Cause of death was not determinable for anyone in the cemetery, although the oldest male did have a large unhealed perforation on his right parietal. Caries were common and associated antemortem tooth loss increased with age, leaving the adult female completely edentulous at death. This project provides an important glimpse of the skeletal health and morphology of one of Indiana's pioneer families.

(17) TOMCZAK, Paula, & Theresa JOLLY. "The Problems and Promise of Using Multifactorial Aging Techniques in the Dunning Population."

A multifactorial approach to the age assessment of skeletal populations poses both promise and problems within paleodemography. Using the skeletal population from the Dunning Poorhouse Cemetery, this study posed three questions: (1) was there a statistically significant difference in the age at death results between research groups; (2) was there a recognizable pattern in the difference in the age at death results between the aging techniques; (3) did using different aging techniques lead to significantly different ages in our sample? Four techniques were used to determine the age at death of each skeleton. These included dental attrition rate, cranial suture closing, auricular surface aging, and epiphyseal formation and fusion rates. A minimum of three groups of researchers independently evaluated each skeleton. Statistical tests were performed to determine whether there was any relationship between the ages determined from each technique. The results indicate that inconsistencies in age determinations arise from the use of different aging techniques; therefore, the four methods can be used as a method of checks and balances when aging a skeletal population. We concluded that investigators must be sensitive to the population-specific nature of aging techniques, as well as sensitive to numerous personal decisions and biases that lead to final age assessments.

(18) WILLIAMS, John. "Forensic Archaeology in North Dakota, 1980 - 1994."

Since 1980, with the arrival of North Dakota's first bioarchaeologist, forensic archaeology has been formally practiced. These fifteen years of activity can be divided into two phases; 1980 - 1989 and 1989 - 1994. The year 1989 marks the state's adoption of new rules regarding the disinterment and analysis of prehistoric human skeletons. With these new rules all prehistoric human skeletal remains must be analyzed prior to their eventual reinterment. A total of 23 cases were classified as having a forensic archaeology nature, those involving a state, federal, or local agency. Not included in this tally were bioarchaeology contracts, non-archaeological forensic cases, and lay discoveries. Of these cases, six took place prior to 1989 with the remaining 17 having occurred during the past five years. These cases were examined for various characteristic traits, including agency type, animal versus human, prehistoric versus historic, regional distribution, skeletal remains, and site location. It is clear that the adoption of new rules regarding the analysis of prehistoric human skeletal remains has dramatically increased the work load for forensic archaeology. In addition, these cases follow a predictable pattern. In the first place, and not unexpectedly, the most likely contact agency will be the County Sheriff and the State Archaeologist. Other state and federal agencies represent a small minority. The remains recovered are very likely to be human and will include either cranial or infracranial elements. Within the State of North Dakota there is no predilection for any particular county. Cases in the contiguous states of Minnesota and South Dakota are too few to draw any distribution conclusions. When human remains are involved they will most likely represent a single burial (twice as frequent as a multiple interment) and will be prehistoric in age. Finally, these remains are almost always discovered at a previously unidentified site. The characterization of these forensic archaeology cases will help develop plans for the future, especially targeting affected agencies and what can be expected in the discovery of buried human skeletons.

(19) WILLIAMSON, Matthew, & Charlene BULOT. "Positive Identification through Radiographic Comparison of a Lumbo-sacral Anomaly: A Case Study."

When human skeletal remains have been found, the chief concern of the physical anthropologist and law enforcement community is to establish the identity of the deceased. This procedure begins

with the determination of sex, age, race, stature, trauma, and any characteristic unique to the individual. Most often positive identification is made through comparison of antemortem dental records to the dentition. However, many times this method cannot be used due to loss of records or the possibility that the deceased was never treated by a dentist. As an alternative, the use of antemortem radiographs of skeletal structures has been established as a means of positive identification. We offer a case study where comparison of an anomaly of the left transverse process of the fifth lumbar vertebra to antemortem x-rays was used to establish identity. The antemortem x-ray had been taken because the deceased was diagnosed with scoliosis and we discuss the possibility of using this anomaly as an indicator of scoliosis in future cases.

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